A durable iliac-axillary and axillary-carotid bypass for cerebral ischemia due to Takayasu arteritis allowed successful pregnancies and deliveries

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A 24-year-old Japanese woman underwent ilioaxillary bypass with an expanded polytetrafluoroethylene graft and axillocarotid bypass with an autologous saphenous vein graft for severe brain ischemia due to Takayasu arteritis. A method that involved wrapping strips of the graft around the artery was used to prevent stretching of the anastomotic site. Her general condition and symptoms improved remarkably. She became pregnant three times and delivered the infants without any complications caused by the operation. The present case contributes to proof of patency, effectiveness, and durability of these bypass grafts. (J Vasc Surg 2010;52:1713-5.)

Takayasu arteritis is a chronic vasculitis mainly involving the aorta and its main branches, such as the brachiocephalic, carotid, subclavian, vertebral, and renal arteries, as well as the coronary and pulmonary arteries.[1-3] The etiology is still not fully known, but early diagnosis and corresponding early treatment have improved the prognosis.[1] Because the incidence of this disease appears to be higher in women,[3,4] especially those of child-bearing age,[3,4] the management of pregnancies in affected women is important.[4]

Young women and their doctors are understandably concerned about the effect of pregnancy on Takayasu arteritis. However, little information is available on complications during pregnancy and the long-term outcome of this disease. Therefore, proof of patency, effectiveness, and durability of revascularization, including during pregnancy and delivery, are necessary. The present case report describes a patient who delivered three infants after uneventful pregnancies and who had no postpartum complications after ilioaxillary bypass and axillocarotid bypass.

CASE REPORT

A 26-year-old Japanese woman was referred to our department for medical follow-up of a bypass graft. She had experienced episodes of fever, headache, nausea, and vomiting since she was 22 years old. Diagnostic imaging showed a small cerebral infarction. Digital subtraction angiography (DSA) showed occlusion of the brachiocephalic artery and the left common carotid artery.

Surgical management using two bypass grafts was performed when she was 24 years old at the Department of Vascular Surgery of the Tokyo Medical and Dental University. The first bypass operation involved placing an 8-mm-diameter expanded polytetrafluoroethylene (ePTFE), stretch-type ring bypass graft from the right external iliac artery to the ipsilateral axillary artery. A method involving wrapping strips of the graft around the artery was used to prevent stretching of the anastomotic site[5,6] (Fig 1). The second operation involved an autologous saphenous vein graft from the right subclavian artery to the ipsilateral common carotid artery. These operations remarkably

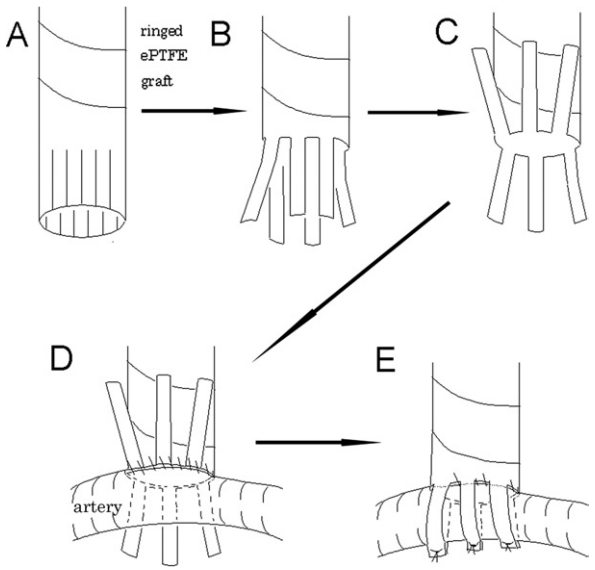

Fig 1. A, Twelve longitudinal cuts were made in the ringed expanded polytetrafluoroethylene (*ePTFE*) graft. **B,** Mesh strips were made by cutting off alternate strips. **C,** The strips were flipped over. **D,** Anastomosis with the ePTFE graft was performed. **E,** The mesh strips were tied to encircle the artery for reinforcement of the anastomotic site.

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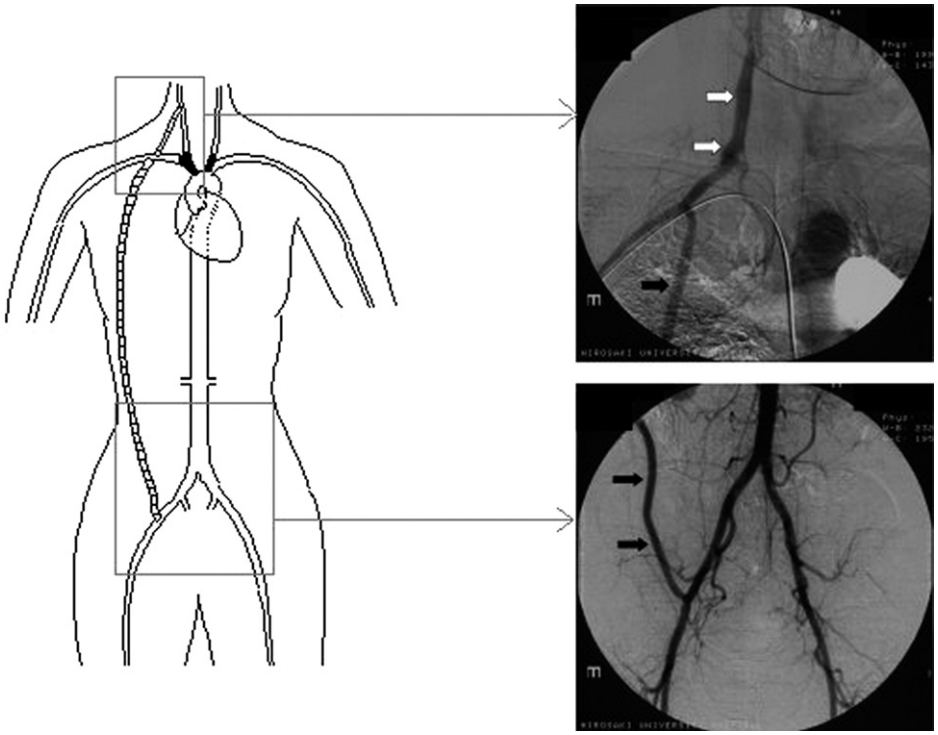

Fig 2. Digital subtraction angiography 6 years after the operation showed a patent ilioaxillary bypass graft *(solid arrows)* and a patent axillocarotid bypass graft *(open arrows)*.

improved the patient's general condition and symptoms. Patency of the extra-anatomic conduits was established by DSA and ultrasound imaging. She was treated with aspirin (100 mg/day), ticlopidine (200 mg/day), and prednisolone (10 mg/day).

During clinical follow-up by our department, she became pregnant three times. She received anticoagulant therapy with subcutaneous heparin at 10000 unit/day after ceasing antiplatelet drugs 4 weeks before the expected date of the delivery. Prednisolone was continued at 7.5 mg/day, the dose taken before and between pregnancies. The first infant was born by vaginal delivery at 38 weeks, the second by cesarean section for placenta previa, and the third by vaginal delivery at 39 weeks. All pregnancies and postpartum periods were uncomplicated, other than the placenta previa in the second pregnancy. During the postpartum periods she remained on long-term anticoagulation therapy, and all laboratory values were within normal reference ranges.

Doppler ultrasound imaging of the carotid arteries confirmed graft patency. The extra-anatomic conduit buried in the flank was patent but displaced slightly laterally. DSA at 6 years after the operation, 9 months after the second delivery, confirmed maintenance of graft patency and no evidence of anastomotic false aneurysms (Fig 2). Doppler ultrasound imaging at 2 months after the third delivery confirmed graft patency.

DISCUSSION

Takayasu arteritis is a rare chronic inflammatory disease of the elastic arteries that primarily affects the aorta and its major branches.[1] The incidence of inflammation is lower for the iliac artery and femoral artery than for the arch vessels, especially at their origins.[2,3] Because the disease is most common among young women, it might have a negative effect on these patients regarding marriage or pregnancy, or both. Ishikawa and Matsuura[7] monitored 27 patients with 33 pregnancies and reported that pregnancy adversely affected the disease in two-thirds of the patients.

On the other hand, Matsumura et al[8] reported that improvement of inflammatory activity and hemodynamic state continued from during pregnancy to 1 year after delivery in patients with Takayasu arteritis. This suggests pregnancy is a state favorable to this disease and that its course can be uneventful if blood pressure and cardiac function are well controlled.[8] Thus, even patients with multiple severe stenoses in major arterial vessels might be able to deliver at term with close management and with intervention if needed.

We believe that the joy of childbearing can brighten the lives of many of these patients. Close collaboration among specialists in obstetrics, internal medicine, perinatology, and surgery is required to obtain good results in the care and treatment of pregnant patients with Takayasu arteritis.

The bypass grafting approach must be selected to place the anastomoses in arterial segments entirely free of inflammation; otherwise, occlusion of the graft might take place.[9] Therefore, good control of the aortitis syndrome seems to

be essential for long-term graft patency after this operation.[3,10] The incidence of inflammation is reportedly lower for the iliac artery and femoral artery than for the aorta.[2,3] Although bypass grafting from the iliac arteries has been reported in patients with Takayasu disease, the long-term outcome of such a long extra-anatomic bypass remains unknown.[10,11] In addition, the most serious late complication of surgery for Takayasu arteritis is anastomotic false aneurysm formation.[3,12] Surgeons must therefore always pay attention to securing sutures.[5,12] The anastomoses with the ePTFE graft were performed with a method[5] designed to avoid stretching and expansion of the suture line.[13]

Patients or doctors might hesitate regarding pregnancy in such cases considering the tension increase due to physical changes caused by pregnancy. The graft route is one of the key things to consider in this regard. During daily activity, considerable movement occurs at the anterior abdominal wall and the groin, so these grafts are buried deeply in the subcutaneous layer at the groin. The flank route is preferred to the anterior abdominal route.[13] The extra-anatomic conduit buried in the flank of this patient was displaced only slightly laterally even in the third trimester of pregnancy. The mesh strips that encircled the artery were able to reinforce the anastomotic site and withstand the increased tension. Hence, the present case contributes to proof of patency, effectiveness, and durability of these bypass grafts.

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